Source of Acquisition
NASA Johnson Space Center

Tissue Engineering and Cellular Regeneration at NASA
Report to Regenetech SAB

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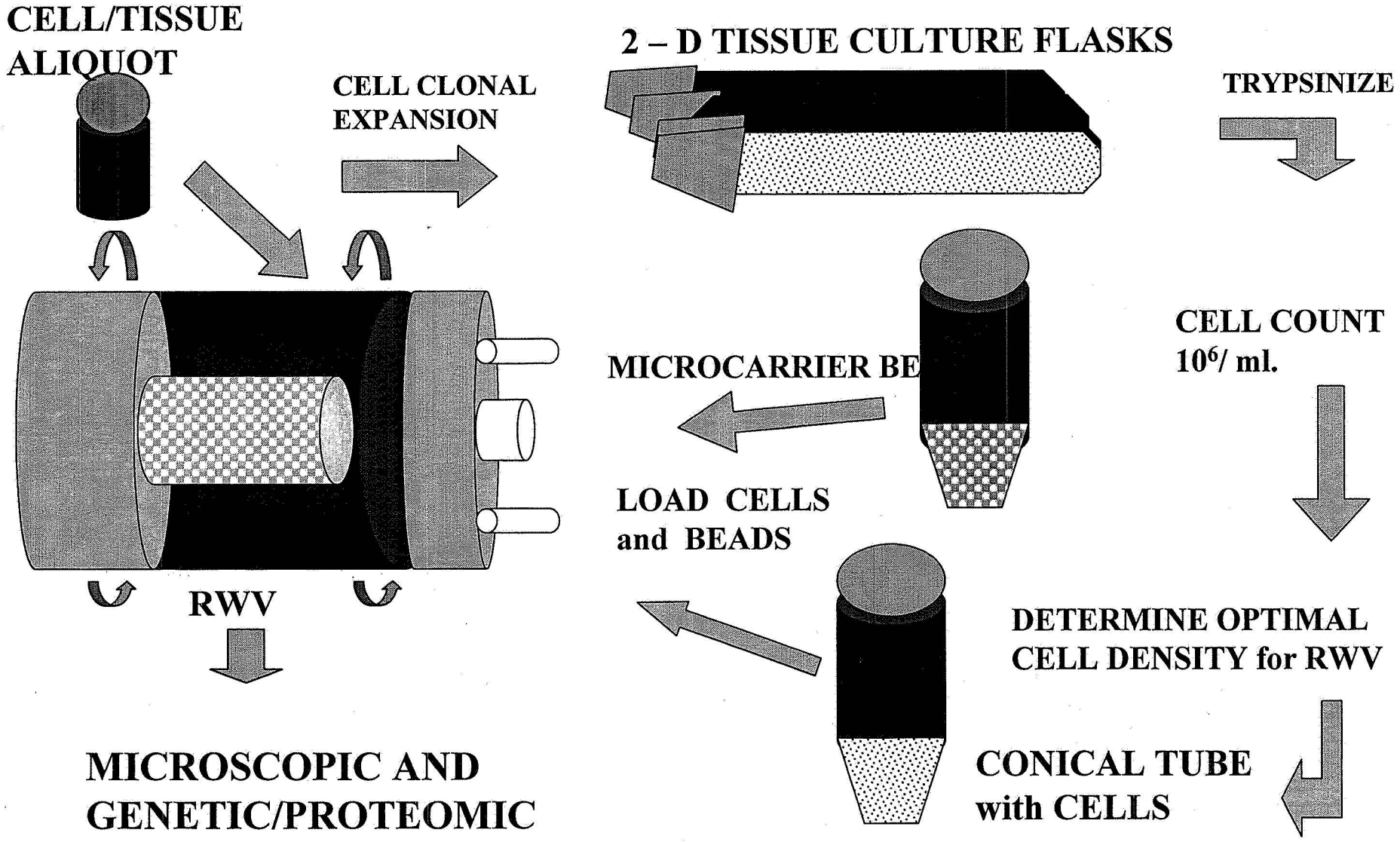
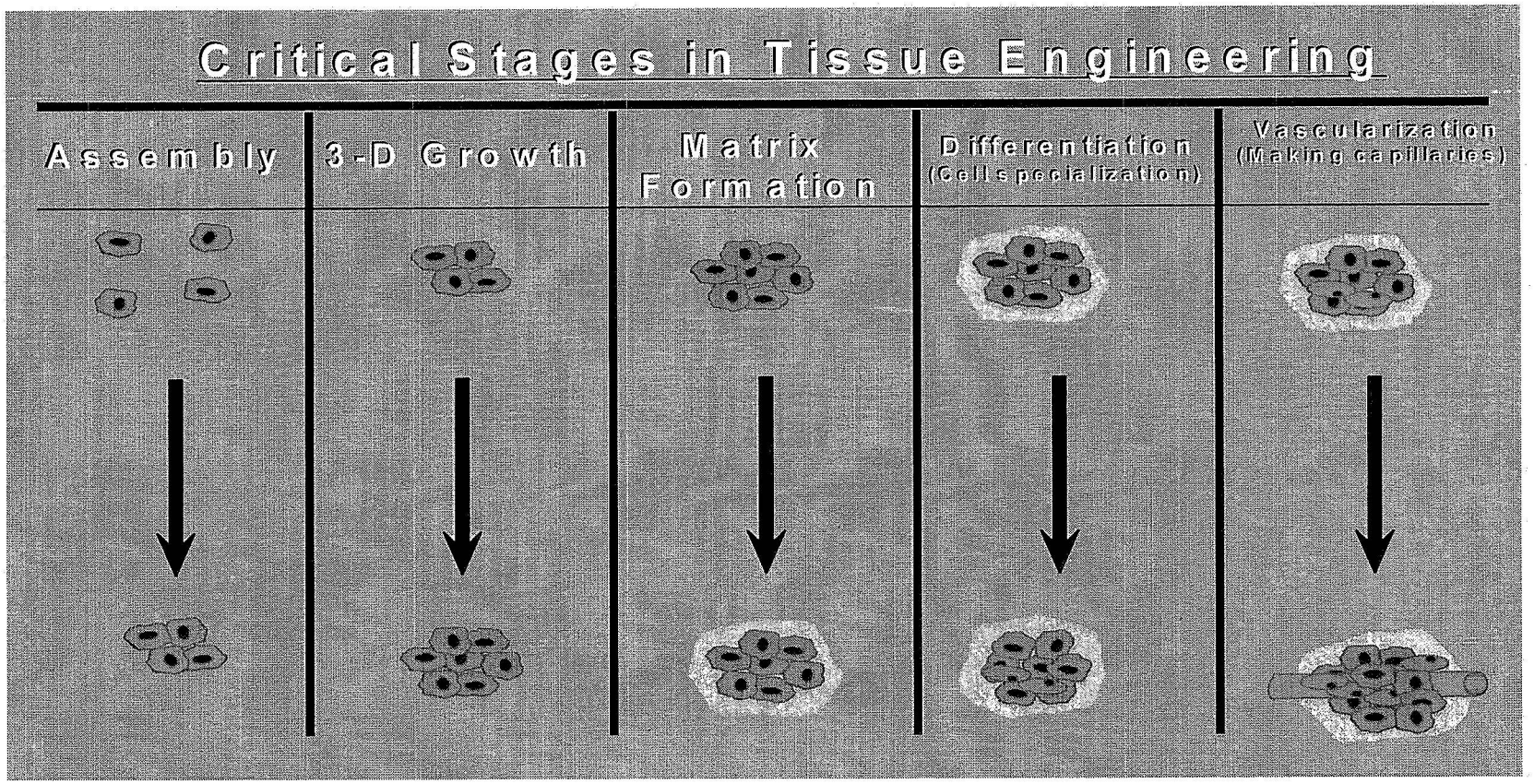
Potential Projects and Applications

- **PROJECTS OVERVIEW**
- **Three-Dimensional Tissue Models For:**
  - **Cellular Regeneration**
  - **Haemopoietic Replacement**
  - **Novel Vaccine Development**
  - **Pharmacology and Toxicology Interventions**
  - **Development of Synthetic Viruses**
  - **Molecular Genetics and Proteomics of Recapitulated Models**

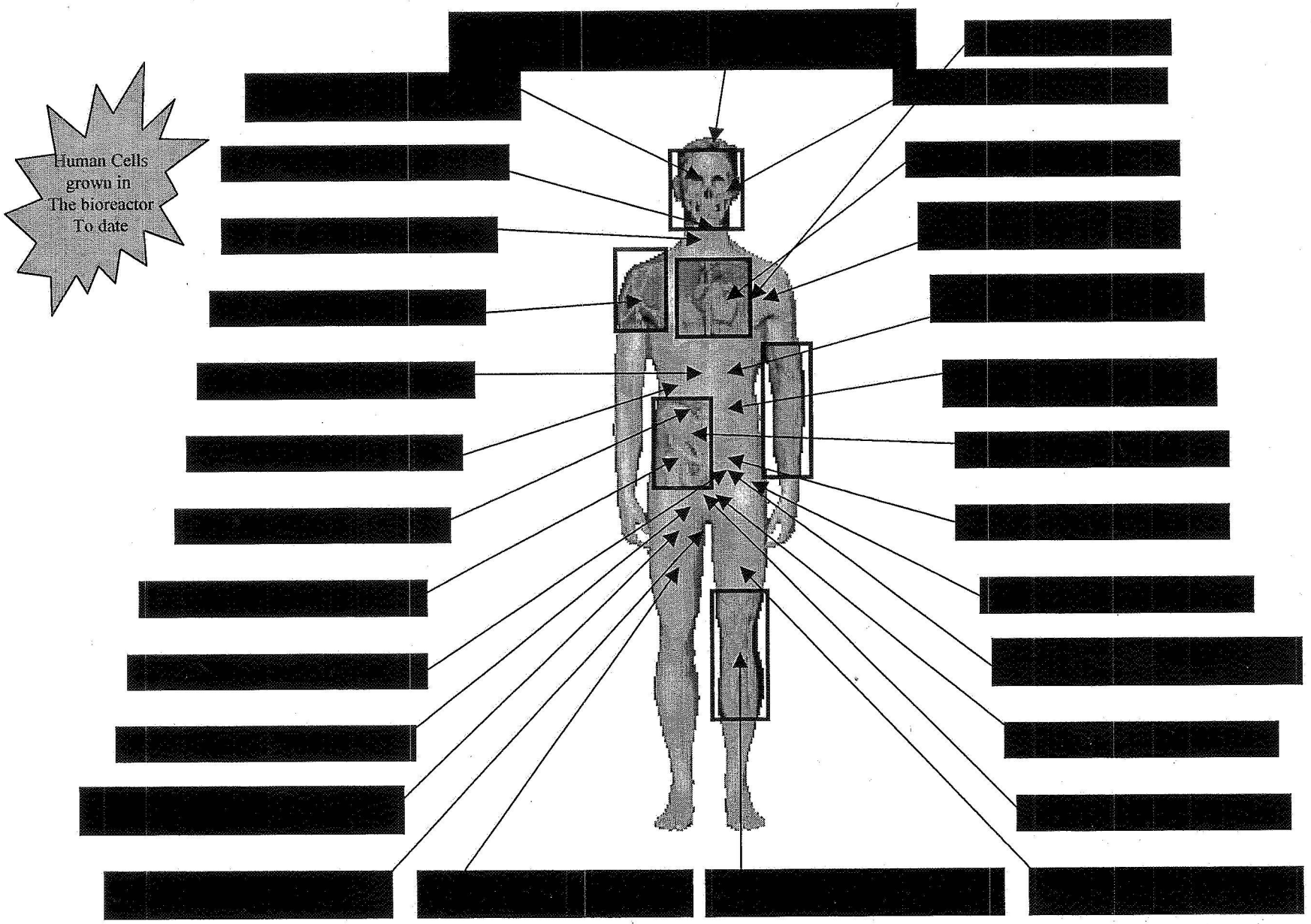
ASSEMBLY of 3 - DIMENSIONAL TISSUE ASSEMBLY into HIGH ASPECT ROTATING WALL VESSEL (STLV)



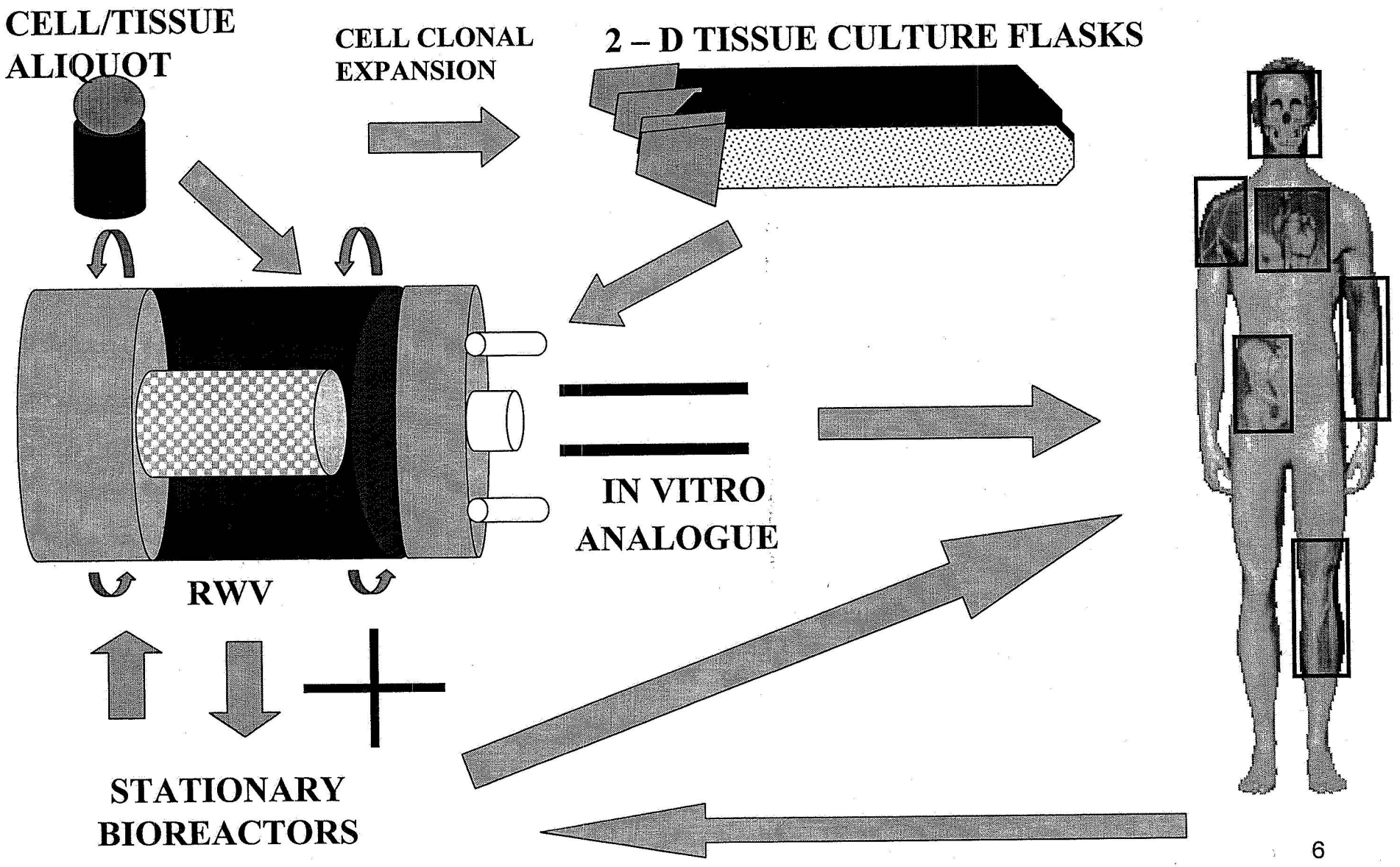
Course Of Cellular Differentiation Into Tissues And Organs



We have specialized in mammalian cell lines; especially human



Assembly Of 3 – Dimensional Tissue Assemblies Into Rotating Wall Vessels: Phase I Of The Synthetic Organ SubSystem (SOS)



DEVELOPMENT OF TISSUE CULTURE ASSEMBLIES

- **CELLS LINES GROWN IN 2-D TISSUE CULTURE FLASKS**
- **CULTURES ESTABLISHED IN GTSF-2 GROWTH MEDIUM**
- **REMOVED FROM T.C FLASKS BY TRYPSIN-EDTA, COUNTED**
- **KNOWN CELL VOLUME INNOCULATED INTO ROTATING WALL VESSEL (RWV)**
- **RWV CONTAINS PREDETERMINED VOLUME OF CTYODEX 3 POLYDEXTRAN MICROCARRIERS**

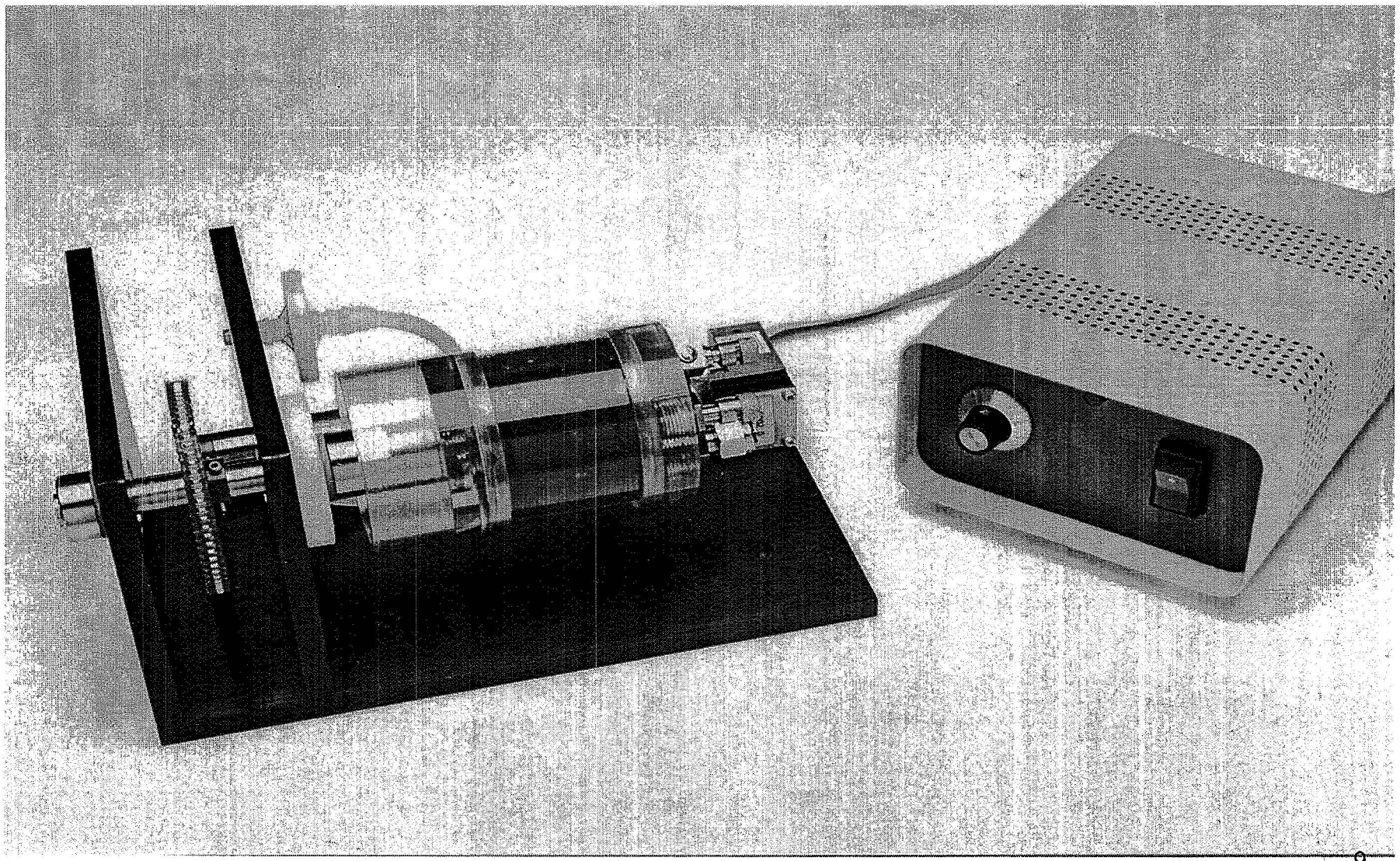
DEVELOPMENT OF TISSUE CULTURE ASSEMBLIES

- **CELLS ADHERE TO GROWTH MATRIX , BEGIN TO MULTIPLY INTO CELL-BEAD AGGREGATES IN A MODELLED MICROGRAVITY ENVIRONMENT**

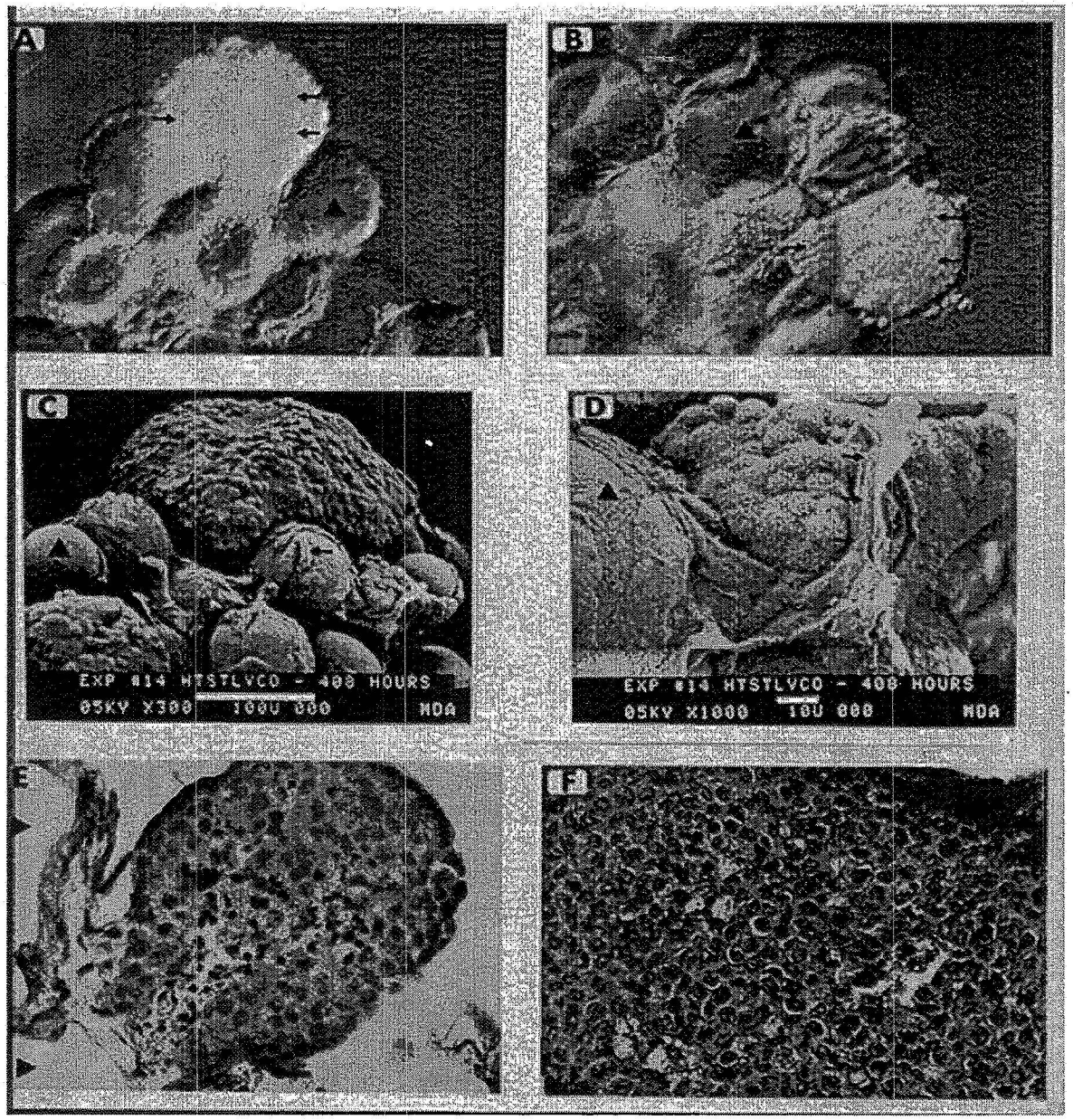
- **CELL-BEAD AGGREGATES IN THE MODELED MICROGRAVITY ENVIRONMENT ALLOWED TO DEVELOP FOR DEFINED TIME PERIOD**

- **CELL AGGREGATES REMOVED FROM RWV FOR CONTINUATION OF EXPERIMENTAL PROTOCOL AT WYETH**

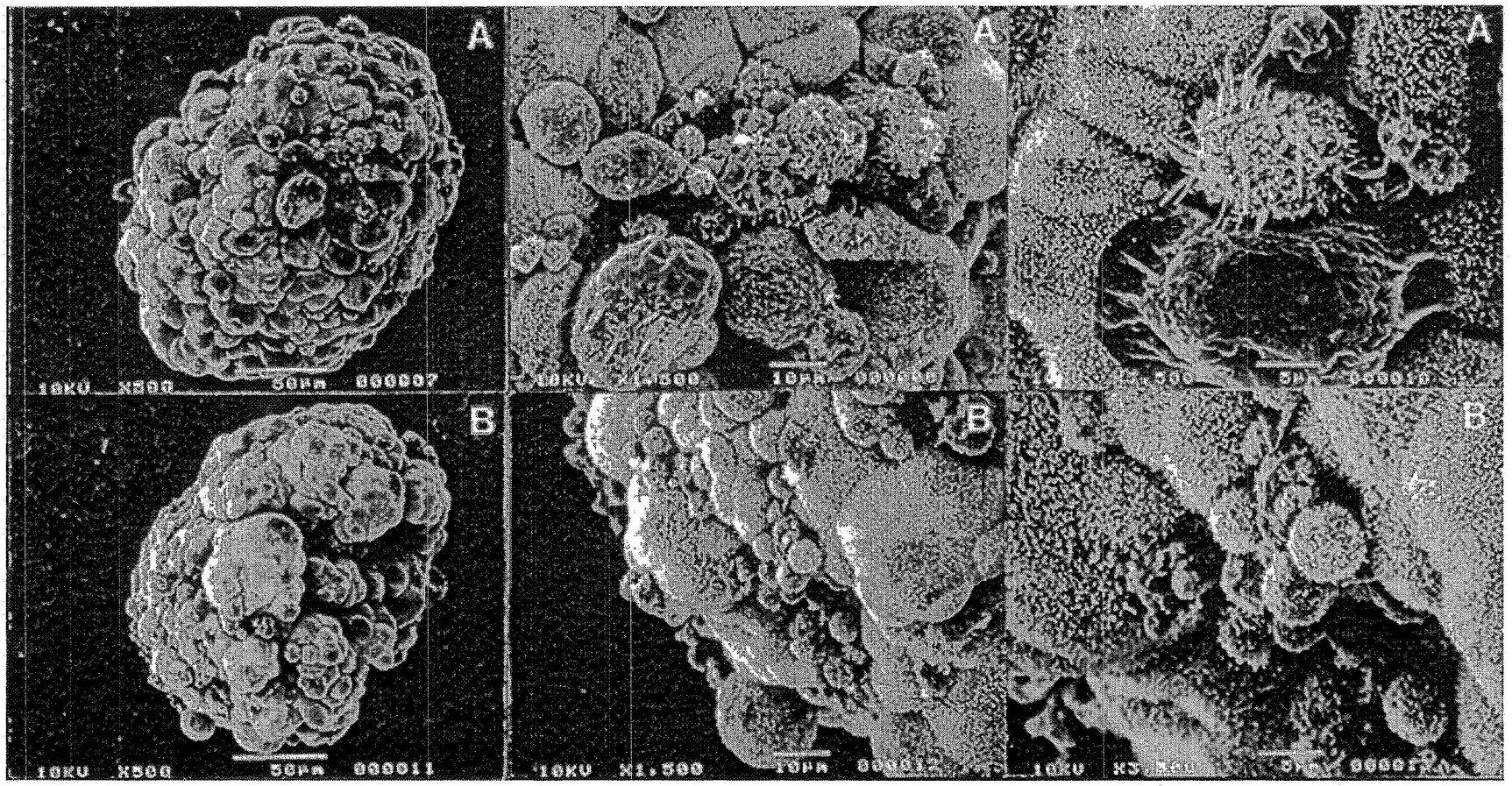
Rotating Wall Vessel



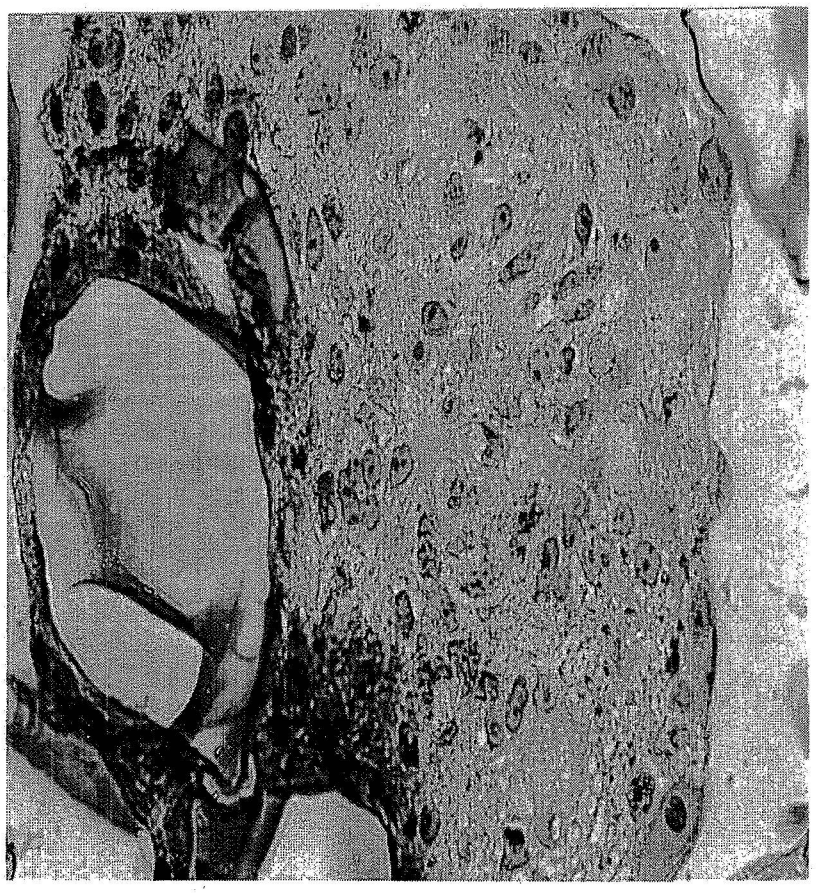
3D Colon Carcinoma Model



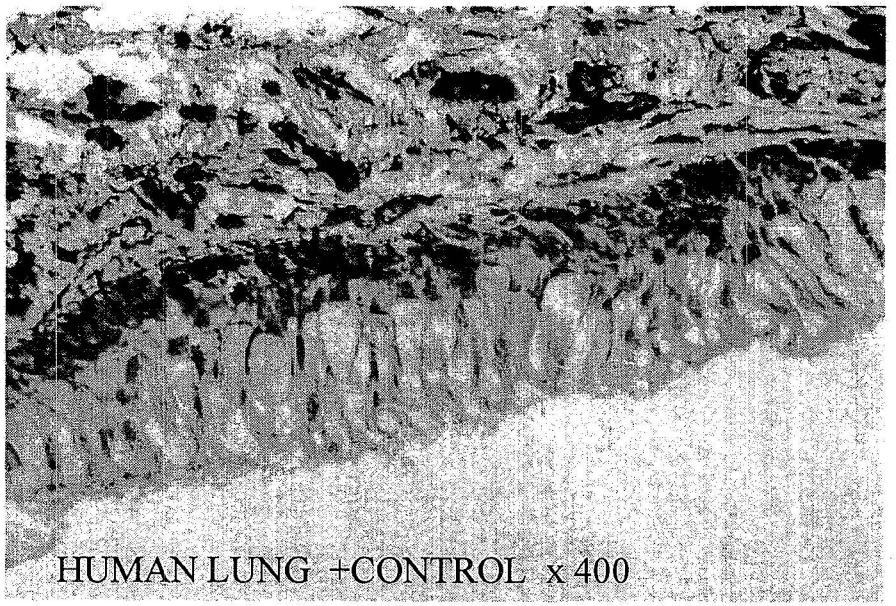
3D Breast Carcinoma with LAK Invasion



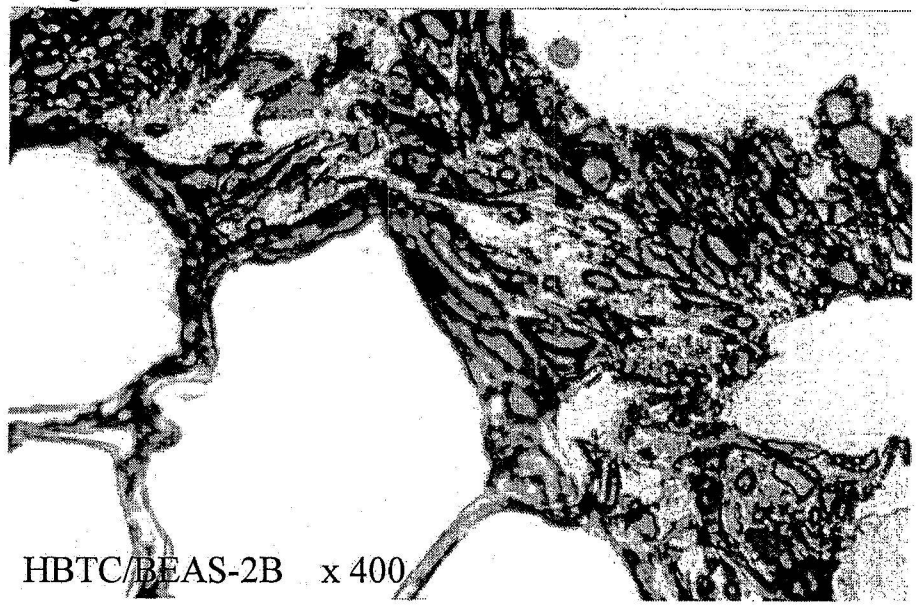
Immunohistochemistry of Human Bronchial Epithelium (HBE) Tissue Like Aggregate (TLA) of HBTC/16HBE14o- H&E 40x



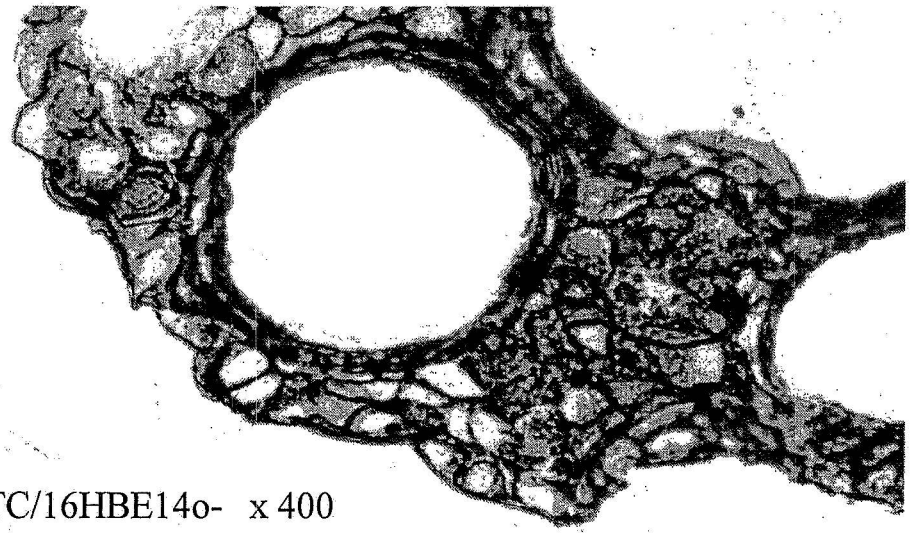
3D TLA Cellular Differentiation : PECAM-1 Antibody



HUMAN LUNG +CONTROL x 400

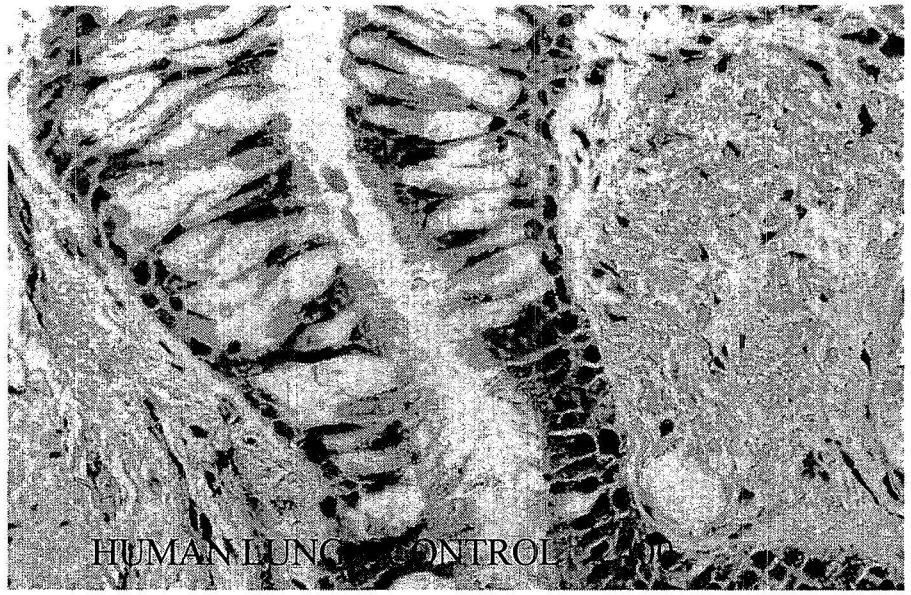


HBTC/BEAS-2B x 400

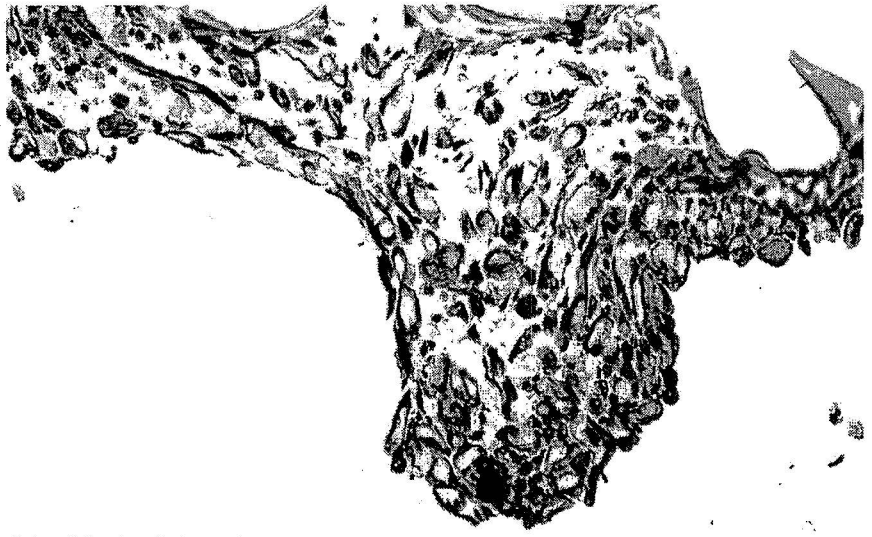


HBTC/16HBE14o- x 400

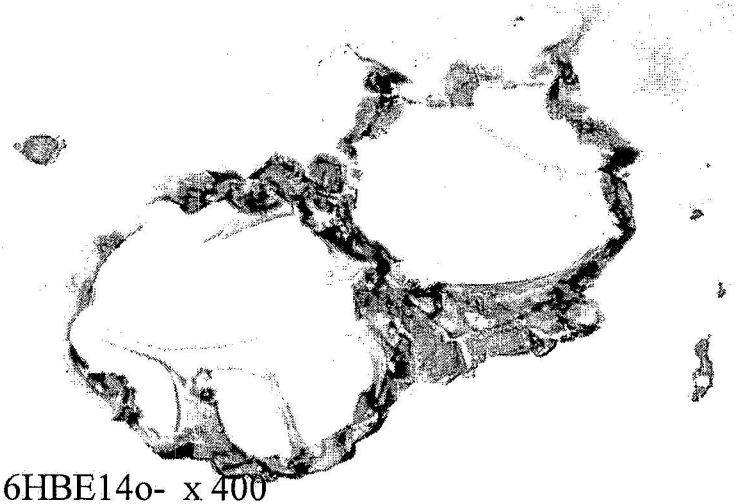
3D TLA Cellular Differentiation : Tubulin Antibody



HUMAN LUNG CONTROL x 400



HBTC/BEAS- 2B x 400



HBTC/16HBE14o- x 400